

Project Baseline Summary Report

Data Source: **EM CDB**
Operations/Field Office: **Savannah River**
Site Summary Level: **Savannah River Site**
Project **SR-HL08 / Saltstone**

Report Number: **GEN-01b**
Print Date: **3/9/2000**
HQ ID: **0043**

General Project Information

Project Description Narratives

Purpose, Scope, and Technical Approach:

Purpose

The Saltstone Facility, which is designated as Z Area, is designed to immobilize and dispose of salt solution waste containing low-levels of radioactivity. The Alternative Salt Processing Facility and low-level effluent from the Effluent Treatment Facility (ETF) produce the waste. Both ASP and ETF are located in H Area. Normally, the ETF waste is blended with the ASP waste at an approximate ratio of 1:8 by volume.

The salt solution is characteristically hazardous waste because of its chromium content and high pH (>10). Based on present permits, Z Area can process up to 172,000,000 gallons of salt solution over the life of the facility at a projected average rate of 4,000,000 gallons per year. The production facility operates under a permit issued by SCDHEC as an industrial waste landfill to be used for the disposal of non-hazardous waste.

Tank 50H and the H-to-Z Interarea Transfer Line serve as the physical interface between Z Area and the waste generating facilities (ASP, ETF). Salt solution is pumped from Tank 50H to Z Area through an underground pipeline into the Salt Solution Holding Tank (SSHT). The SSHT is located next to the treatment facilities in the Process Building (Building 210-Z) used to produce saltstone grout. The salt solution is combined with cement, slag, and flyash to form non-hazardous saltstone grout. The grout is pumped into concrete vaults, also located in Z Area, where it cures and hardens into a non-hazardous solid monolith. The vaults provide a permanent and safe form of disposal for saltstone.

Scope includes:

- Receive and process approximately 4,000,000 gallons per year of salt solution (combined total) from ASP, and ETF
- Complete disposal vault capping as required
- Review, revise and maintain the closure plan and Radiological Performance Assessment
- Design and construct additional Saltstone Vaults or alternatives as needed
- Critical maintenance activities including: predictive, preventive, and corrective maintenance, equipment troubleshooting, excavations and grounds maintenance, administration of the paving and HVAC subcontracts, preparation of purchase requisitions and ordering and staging parts and materials; preparation of spare parts data sheets, and facility outage scheduling
- Saltstone Facility was laid up in FY99 awaiting ASP technology re-evaluation. Saltstone Facility will be restaffed once ASP Technology re-evaluation is complete. Personnel will be retrained and startup testing will be performed to support ETF and ASP process.

Technical Approach:

The key technologies used in the safe storage and management of this low-level radioactive liquid salt solution are:

- Stabilization (addition of cement, slag and flyash to stabilize the waste in a solid matrix that passes the Toxicity Characteristic Leachate Procedure)
- Solidification (allows the grout to harden into a solid Saltstone waste form in engineered vaults for permanent disposal)

Dataset Name: **FY 1999 Planning Data**

Date of Dataset: **9/20/1999**

Page 1 of 8

Project Baseline Summary Report

Data Source: **EM CDB**
Operations/Field Office: **Savannah River**
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Print Date: **3/9/2000**
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- Transfer Systems (pumping, piping, and mixer)

Project Status in FY 2006:

- Approximately 18 million gallons of waste salt solution will have been received, treated and disposed in Saltstone Vaults from June 1990 (radioactive startup) through the end of FY06.
- Saltstone Facility was de-staffed and placed in warm standby in FY98 due to uncertainties in Alternative Salt Processing technology and will be re-staffed and started up in FY03-FY04 to support
- ETF/tank 50 processing of approximately 1.6 million gallons of liquid from Evaporator Bottoms, which will be treated in Saltstone Facility.

Post-2006 Project Scope:

- Approximately 110 million gallons of waste salt solution will have been received, treated and disposed in Saltstone Vaults from FY07-FY26. (The total includes an estimated 108.3 million gallons of salt solution from the Alternative Salt Processing and an estimated 1.7 million gallons of evaporator bottoms material from the Effluent Treatment Facility.)

Project End State

The project will end in FY26 when all low level radioactive salt solution has been stabilized in a cementitious matrix and allowed to harden in engineered, above-ground vaults. At that time, the Saltstone Processing Building will be available to start D&D activities. The Saltstone Disposal Vaults will be closed by backfilling around the vaults with native soils and installing successive layers of clay, gravel, geotextile fabric, and other materials and vegetation specifically designed to drain surface waters away from the disposal vaults. Deactivation and disposition of Saltstone will be carried out in accordance with PBS FA-25.

Cost Baseline Comments:

Note: This narrative describes major changes from year to year in this project.

FY97: In December 1996, the High Level Waste Program, in taking on a management challenge to further reduce operating costs, implemented a \$0.2 million productivity improvement for FY97 and an additional \$.5 million productivity improvement for FY98. These combined savings are included in the estimates for each year through FY26, the last year of the Saltstone Facility operations. Escalation is for each year of the project.

FY98: Costs are reduced \$.5 million due to productivity improvements (as discussed above). Saltstone vault alternative design work of \$.4 million will be completed in FY98 and not continued into FY99.

FY99: Due to limited funding, the Saltstone Facility will be de-staffed and placed in lay-up, reducing costs in FY99 but the life-cycle cost will be extended due to these changes.

FY00: No substantive changes to the program.

FY01: No substantive changes to the program.

FY02: Equipment costs increase by approximately \$1.5 million due to additional saltstone needs for process hold tank to support process material coming from ETF, CIF, and ASP.

FY03-FY04: In FY03 cost increase to approximately \$ 9.0 million as Saltstone is re-staffed and startup activities are initiated.

FY05: In FY05 there is a scheduled increase in production rates. Accordingly, production staffing and materials are increased, at an estimated cost of

Dataset Name: **FY 1999 Planning Data**

Date of Dataset: **9/20/1999**

Page 2 of 8

Project Baseline Summary Report

Data Source: **EM CDB**

Operations/Field Office: **Savannah River**

Site Summary Level: **Savannah River Site**

Project **SR-HL08 / Saltstone**

Report Number: **GEN-01b**

Print Date: **3/9/2000**

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Project Description Narratives

\$1.3 million.

FY09: Construction of additional vaults must resume because the vaults prior to FY97 will be filling. The vaults' construction program will continue through the end of the program at annual cost range of 11 million to 12 million per year. FY10: Production increase due to startup of Alternate Salt Processing Facility. Expected 2 to 3 shift operations.

FY11-FY25: There are no substantive changes to the project in these years except for the variability of vault construction and material costs Facility.

FY26: The Saltstone Facility operates for a part of the year. Following completion of salt solution processing, the cost of the project will be reduced and the facility will be deactivated and decommissioned.

Safety & Health Hazards:

The main hazards in this facility result from the activities required to safely receive, treat and dispose the low-level radioactive liquid salt solution from the Alternative Salt Processing (Project SR-HL13) and the Effluent Treatment Facility (Project SR-HL07). This waste is generated as a by-product of the waste treatment processes conducted at the ASP and ETF facilities. The Saltstone Facility combines the salt solution with cement, flyash and blast furnace slag, forming a grout. The grout is pumped to above-grade, engineered concrete vaults and allowed to harden in place. The hardened waste form is called saltstone. Before treatment at Saltstone, the salt solution is classified as a mixed waste stream, because it has a high pH and because it contains chromium and some radionuclides (principally Technetium-99, Ruthenium-106 and Rhodium-106). After treatment, the solidified saltstone is classified as non-hazardous. Key Saltstone Facility components include an underground, inter-area waste transfer line; the Salt Solution Hold Tank; dry materials storage silos; a horizontal twin screw mixer; an analytical laboratory, and engineered, concrete disposal vaults. Two vaults, #1 (containing 6 cells) and #4 (containing 12 cells), are already operational. Up to fourteen (12 cell) vaults and one (6 cell) vault (total) will be required over the life of the facility.

Hazards and controls in place are described in the following documents:

- WSRC-RP-92-444, Rev. 2, July 1997, "Justification for Continued Operation of the SRS Saltstone Facilities (Z-Area)"

Safety & Health Work Performance:

Activities and checkpoints are described by the Integrated Management System Description. The conditions and requirements are clearly established and agreed upon prior to the starting of any project and those requirements are contractually binding upon WSRC. The key elements of the WSRC Integrated Safety Program are to define the scope of work, identify and analyze hazards associated with the work, develop and implement hazard controls, perform work within controls, and provide feedback on adequacy of controls and continue to improve safety management. The WSRC Integrated Procedures Management System is the primary mechanism for implementing the objective, principles and functions of the Safety Management System. This system establishes Company-Level, Division-level, and Program-specific procedures consistent with organizational roles, and ensures a consistent, discipline site-wide approach to safety while performing work.

PBS Comments:

Funding for the Saltstone Facility is at the minimum level necessary to assure safe and efficient receipt, treatment and disposal of the low-level radioactive liquid salt solutions and to meet an overall system production of 150 glass canisters in FY97, 200 canisters per year from FY98-04, 225 canisters in FY05, and 200-250 canisters per year FY06-FY20 (See Cost Baseline Narrative). A reduction in funding for related projects (i.e.,

Dataset Name: **FY 1999 Planning Data**

Date of Dataset: **9/20/1999**

Page 3 of 8

Project Baseline Summary Report

Data Source: **EM CDB**

Operations/Field Office: **Savannah River**

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Project **SR-HL08 / Saltstone**

Report Number: **GEN-01b**

Print Date: **3/9/2000**

HQ ID: **0043**

Project Description Narratives

ITP/ESP, Vitrification, ETF) would eliminate the mortgage reductions for surveillance and maintenance that can be generated as groups of tanks are closed.

The Saltstone Facility operates under two SCDHEC permits: a wastewater permit for salt solution processing, and an industrial landfill permit for disposing the grout in the vaults.

The major drivers for this project are:

- Federal Facilities Agreement (FFA) - Executed by the Department of Energy, the Environmental Protection Agency and the South Carolina Department of Health and Environmental Control on January 15, 1993. The continued storage of liquid, high-level radioactive waste is a concern to SRS Stakeholders and Regulators. The 2028 FFA commitment date originally proposed to complete removal of all wastes from tanks that do not meet secondary containment requirements has been rejected by the state as not aggressive enough. Negotiations are underway to establish a commitment date that will meet regulatory expectations while balancing technical and resource limitations.
- Site Treatment Plan - The Site Treatment Plan for SRS includes the following commitments for DWPF (Vitrification, SR-HL05): "After the startup period is complete and DWPF begins full operation, the maintenance of an average of 200 canisters of processed glass per year will be required in order to meet the schedule for removal of backlogged and currently generated waste inventory by the year 2028."

This requires the Saltstone Facility operation to be funded at the level necessary to safely receive, treat and dispose the low level radioactive salt solutions generated by ITP, and ETF in support of the Vitrification Facility projected production rate.

Saltstone Facility can be destaffed in FY99 without affecting DWPF production. DWPF will continue with sludge only operation while ITP remains shutdown. Tank 50 capacity will be available to accept waste from ETF while no filtrate from ITP will be added. If Tank 50 can no longer accept waste, ETF Evaporator Bottoms can be routed elsewhere in the Tank Farm facilities.

Baseline Validation Narrative:

General PBS Information

Project Validated?	Date Validated:
Has Headquarters reviewed and approved project?	No
Date Project was Added:	12/1/1997
Baseline Submission Date:	7/3/1999
FEDPLAN Project?	Yes

Dataset Name: **FY 1999 Planning Data**

Date of Dataset: **9/20/1999**

Project Baseline Summary Report

Data Source: **EM CDB**
 Operations/Field Office: **Savannah River**
 Site Summary Level: **Savannah River Site**
 Project **SR-HL08 / Saltstone**

Report Number: **GEN-01b**
 Print Date: **3/9/2000**
 HQ ID: **0043**

General PBS Information

Drivers:	CERCLA	RCRA	DNFSB	AEA	UMTRCA	State	DOE Orders	Other
	N	N	N	N	N	Y	N	N

Project Identification Information

DOE Project Manager: H. Gnann
DOE Project Manager Phone Number: 803-725-6076
DOE Project Manager Fax Number: 803-208-7414
DOE Project Manager e-mail address: howard.gnann@srs.gov
Is this a High Visibility Project (Y/N):

Planning Section

Baseline Costs (in thousands of dollars)

	1997-2006 Total	2007-2070 Total	1997-2070 Total	1997	Actual 1997	1998	Actual 1998	1999	2000	2001	2002	2003	2004	2005	2006	
PBS Baseline (current year dollars)	73,492	1,090,214	1,163,706	7,359	7,359	8,121	8,121	934	1,222	1,032	3,977	13,118	14,078	11,668	11,983	
PBS Baseline (constant 1999 dollars)	65,405	654,929	720,334	7,359	7,359	8,121	8,121	934	1,180	962	3,608	11,588	12,109	9,772	9,772	
PBS EM Baseline (current year dollars)	73,492	1,090,214	1,163,706	7,359	7,359	8,121	8,121	934	1,222	1,032	3,977	13,118	14,078	11,668	11,983	
PBS EM Baseline (constant 1999 dollars)	65,405	654,929	720,334	7,359	7,359	8,121	8,121	934	1,180	962	3,608	11,588	12,109	9,772	9,772	
	2007	2008	2009	2010	2011- 2015	2016- 2020	2021- 2025	2026- 2030	2031- 2035	2036- 2040	2041- 2045	2046- 2050	2051- 2055	2056- 2060	2061- 2065	2066- 2070
PBS Baseline (current year dollars)	13,006	14,143	15,634	45,630	298,104	316,952	356,081	30,664	0	0	0	0	0	0	0	0

Dataset Name: **FY 1999 Planning Data**

Date of Dataset: **9/20/1999**

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Operations/Field Office: **Savannah River**

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Report Number: **GEN-01b**

Print Date: **3/9/2000**

HQ ID: **0043**

	2007	2008	2009	2010	2011- 2015	2016- 2020	2021- 2025	2026- 2030	2031- 2035	2036- 2040	2041- 2045	2046- 2050	2051- 2055	2056- 2060	2061- 2065	2066- 2070
PBS Baseline (constant 1999 dollars)	10,328	10,935	11,770	33,450	201,887	187,883	184,751	13,925	0	0	0	0	0	0	0	0
PBS EM Baseline (current year dollars)	13,006	14,143	15,634	45,630	298,104	316,952	356,081	30,664	0	0	0	0	0	0	0	0
PBS EM Baseline (constant 1999 dollars)	10,328	10,935	11,770	33,450	201,887	187,883	184,751	13,925	0	0	0	0	0	0	0	0

Baseline Escalation Rates

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
0.00%	0.00%	0.00%	3.60%	3.60%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%
2010	2011-2015	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050	2051-2055	2056-2060	2061-2065	2066-2070
2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%

Project Reconciliation

Project Completion Date Changes:

Previously Projected End Date of Project: 9/1/2024

Current Projected End Date of Project: 9/30/2026

Explanation of Project Completion Date Difference (if applicable):

Schedule extended to match new HLW schedule.

Project Cost Estimates (in thousands of dollars)

Previously Estimated Lifecycle Cost (1997 - 2070, 1998 Dollars):	475,536	Actual 1997 Cost:	7,359	Actual 1998 Cost:	8,121
Previously Estimated Lifecycle Cost of Project (1999 - 2070, 1998 Dollars):	460,056	Inflation Adjustment (2.7% to convert 1998 to 1999 dollars):			12,422

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Date of Dataset: **9/20/1999**

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Site Summary Level:	Savannah River Site	HQ ID:	0043
Project	SR-HL08 / Saltstone		

Project Reconciliation

Previously Estimated Lifecycle Cost (1999 - 2070, 1999 Dollars):	472,478	
Project Cost Changes		
	Cost Adjustments	Reconciliation Narratives
Cost Change Due to Scope Deletions (-):		
Cost Reductions Due to Efficiencies (-):		
Cost Associated with New Scope (+):		
Cost Growth Associated with Scope Previously Reported (+):	232,377	Revised project estimate and schedule to coincide with HLW schedule.
Cost Reductions Due to Science & Technology Efficiencies (-):		
Subtotal:	704,855	
Additional Amount to Reconcile (+):	-1	
Current Estimated Lifecycle Cost (1999 - 2070, 1999 Dollars):	704,854	

Milestones

Milestone/Activity	Field Milestone Code	Original Date	Baseline Date	Legal Date	Forecast Date	Actual Date	EA	DNFSB	Mgmt. Commit.	Key Decision	Intersite
Project Mission Complete	SR-HL08-016		9/30/2026								
Project Start	SR-HL08-001		10/1/1996								

Milestones - Part II

Milestone/Activity	Field Milestone Code	Critical Decision	Critical Closure Path	Project Start	Project End	Mission Complete	Tech Risk	Work Scope Risk	Intersite Risk	Cancelled	Milestone Description
Project Mission Complete	SR-HL08-016				Y						
Project Start	SR-HL08-001			Y							

Performance Measure Metrics

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Project **SR-HL08 / Saltstone**

Report Number: **GEN-01b**

Print Date: **3/9/2000**

HQ ID: **0043**

Category/Subcategory	Units	1997-2006 Total	2007-2070 Total	1997-2070 Total	Actual Pre-1997	Planned 1997	Actual 1997	Planned 1998	Planned 1999	Planned 2000	Planned 2001	Planned 2002	Planned 2003	Planned 2004
LLW														
Treatment	M3	0.00	0.00	0.00	0.00		0.00							
LLW														
Storage	M3							0.00	0.00	0.00	0.00	0.00	0.00	0.00
LLW														
On-Site Disp.	M3	6,813.00	407,388.00	414,201.00	0.00		0.00	757.00	757.00	757.00	757.00	757.00	757.00	757.00
Category/Subcategory	Units	Planned 2004	Planned 2005	Planned 2006	Planned 2007	Planned 2008	Planned 2009	Planned 2010	Planned 2011 - 2015	Planned 2016 - 2020	Planned 2021 - 2025	Planned 2026 - 2030	Planned 2031 - 2035	Planned 2036 - 2040
LLW														
Treatment	M3													
LLW														
Storage	M3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LLW														
On-Site Disp.	M3	757.00	757.00	757.00	757.00	757.00	757.00	15,757.00	142,078.00	129,905.00	104,659.00	12,718.00		
Category/Subcategory	Units	Planned 2036 - 2040	Planned 2041 - 2045	Planned 2046 - 2050	Planned 2051 - 2055	Planned 2056 - 2060	Planned 2061 - 2065	Planned 2066 - 2070	Exceptions	Lifecycle Total				
LLW														
Treatment	M3									1,283.00				
LLW														
Storage	M3													
LLW														
On-Site Disp.	M3									414,739.00				

Dataset Name: **FY 1999 Planning Data**

Date of Dataset: **9/20/1999**